generating said periodic drive signal by combining an amplified periodic signal at said preset frequency and at least an amplified periodic signal at a harmonic of said preset frequency, and

B31 Cont'd

emitting a sequence of substantially chirp-free optical pulses at the transmission wavelength having a duration T_{FWHM}, the ratio T_{bit}/T_{FWHM}, between the inverse T_{bit} of said preset frequency and said duration T_{FWHM} of the pulses, being higher than 200/75 and lower than 10.

IN THE DRAWINGS

Approval of the attached proposed drawing changes is respectfully requested.

REMARKS

Favorable reconsideration of this application, in view of the following comments and as presently amended, is respectfully requested.

The specification has been amended by the present response to correct for minor grammatical and idiomatic informalities. The changes made to the specification are deemed to be self-evident from the original disclosure, and thus are not deemed to raise any issues of new matter.

Proposed drawing changes are submitted with this response to label the block elements in the figures.

Claims 31-52 are pending in this application. Claim 35 was rejected under 35 U.S.C. §112, second paragraph. Claims 31 and 33-40 were rejected under 35 U.S.C. §103(a) as unpatentable over O'Mahony, "Non-linear Optical Transmission Systems", 1993, in view of U.S. patent no. 5,361,319 to Antos et al. (herein "Antos"), WO 96/27956, and in view of U.S.

patent no. 5,570,438 to Fontana et al. (herein "Fontana"). Claim 32 was rejected under 35 U.S.C. §103(a) as unpatentable over O'Mahony in view of Antos, WO 96/27956, and Fontana as applied to claim 31, and further in view of U.S. patent no. 5,267,073 to Tamburello et al. (herein "Tamburello"). Claim 41 was rejected under 35 U.S.C. §103(a) as unpatentable over O'Mahony in view of Antos, WO 96/27956, and Fontana as applied to claim 40, and further in view of EP 0 690 534 A2. Claims 42-45 and 47-49 were rejected under 35 U.S.C. §103(a) as unpatentable over O'Mahony in view of EP 0 690 534 A2. Claim 46 was rejected under 35 U.S.C. §103(a) as unpatentable over O'Mahony in view of EP 0 690 534 A2 as applied to claim 42, and further in view of U.S. patent no. 4,093,919 to Watanabe. Claims 50-51 were rejected under 35 U.S.C. §103(a) as unpatentable over O'Mahony in view of EP 0 690 534 A2 as applied to claim 49, and further in view of U.S. patent no. 5,946,117 to Meli et al. (herein "Meli"). Claim 52 was rejected under 35 U.S.C. §103(a) as unpatentable over EP 0 690 534 A2.

Addressing first the rejection of claim 35 under 35 U.S.C. §112, second paragraph, that rejection is traversed by the present response.

Claim 35 has been amended by the present response to no longer recite "said second optical signal" at line 4, and now instead recites "said optical signal". Claim 34 is now believed to provide proper antecedent basis for all terms and is believed to be in full compliance with all requirements under 35 U.S.C. §112, second paragraph.

Addressing now the rejection of claims 31 and 33-40 under 35 U.S.C. §103(a) as unpatentable over O'Mahony in view of Antos, WO 96/27956, and Fontana, the further rejection of claim 30 further in view of Tamburello, and the further rejection of claim 41 further in view of EP 0 690 534 A2, those rejections are traversed by the present response.

Independent claim 31 positively recites "the ratio T_{bit}/T_{FWHM}, between the inverse T_{bit} of said preset frequency and said duration T_{FWHM} of the pulses, is higher than 200/75 and lower than 10". Independent claim 40 recites a similar limitation. That feature positively recited in claims 31 and 40 is neither taught nor suggested by the applied art.

To meet the above-noted feature recited in independent claims 31 and 40 the outstanding Office Action cites the teachings in WO 96/27956, and particularly at page 4, lines 1-3, where that reference states that "solitons are a small fraction (typically about 20%) of the bit period wide, and pulse arrival may be anywhere within the bit period". However, the outstanding rejection misinterprets that teaching in WO 96/27956 relative to the claimed invention.

More specifically, the noted teaching in WO 96/27956 is merely directly to the width of a soliton time within a bit period. In other words, WO 96/27956 merely indicates that a bit may arrive at any time within a bit period, and the bit is only 1/5 as wide as the entire bit period in which it may arrive. In that way, that teaching in WO 96/27956 at most indicates an optical pulse duration, which would correspond to T_{FWHM} recited in independent claims 31 and 40.

However, the teaching in WO 96/27956 does not even address a parameter similar to T_{bit} also required in claims 31 and 40. The value T_{bit} is an inverse of a preset transmission frequency or "bit rate".[2] The property T_{bit} is thereby directed to how often bits arrive, which is not even addressed in WO 96/27956. That is, WO 96/27956 merely indicates that a soliton time may have a width which is 1/5 of a bit period, but that disclosure in WO 96/27956 does not even address any parameter of T_{bit} of the inverse of the preset transmission frequency.

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[2]Present specification at page 16, lines 35-36.

As a result, WO 96/27956 also does not teach or suggest the claim limitation directed to the ratio of T_{bit}/T_{FWHM}.

Further, the ratio noted in the Office Action of "5" is only a ratio directed to a total duration of a bit period divided by a duration of a solid time in WO 96/27956. However, that total duration of the bit period is not equivalent to the T_{bit} recited in claims 31 and 40 which is an inverse of a preset transmission frequency or "bit rate". Stated another way, a length of a bit period is not equivalent to the bit rate parameter set forth in claims 31 and 40.

In such ways, independent claims 31 and 40, and the claims dependent therefrom, patentably distinguish over the applied art.

Addressing now the rejection of claims 42-45 and 47-49 under 35 U.S.C. §103(a) as unpatentable over O'Mahony in view of EP 0 690 534 A2, the further rejections to claim 46 further in view of Watanabe, and the further rejection of claims 50-51 further in view of Meli, those rejections are traversed by the present response.

It is initially noted that independent claim 42 has been amended by the present response to recite the feature noted above with respect to claim 31 directed to the generated optical pulses satisfying the ratio T_{bit}/T_{FWHM}. That feature now clarified in claim 42, and the claims dependent therefrom, is neither taught nor suggested by EP 0 690 534 A2. Further, as noted above in detail, that feature is also not taught or suggested by the other noted applied art.

Thus, amended independent claim 42, and the claims dependent therefrom, also patentably define over the applied art.

Addressing now the rejection of claim 52 under 35 U.S.C. §103(a) as unpatentable over EP 0 690 534 A2, that rejection is also traversed by the present response.

Claim 52 has also been amended similarly as in claim 42 noted above. As also noted above, the feature now recited in independent claim 52 is neither taught nor suggested by EP 0 690 534 A2. Thus, claim 52 is also allowable.

As no other issues are pending in this application, it is respectfully submitted that the present application is now in condition for allowance and it is hereby respectfully requested that this case be passed to issue.

Respectfully submitted,

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Marked-Up Copy
Serial No: 09/497,694
Amendment Filed on:
2-28-02

IN THE SPECIFICATION

Please amend the specification as follows:

Page 1, after the title and before prenumbered line, please insert the following:

--BACKGROUND OF THE INVENTION--.

Page 1, please replace the paragraph at lined 25-32, as follows:

--A characteristic common to the aforesaid techniques consists of the fact that they are efficient for generating particularly short pulses suitable for transmission over dispersion-shifted or DS fibres, i.e. fibres with chromatic dispersion which approaches zero within the wavelength band employed for [telecom-munications,] telecommunications, [round] around about 1550 nm, as for example defined by the ITU-T Recommendation G653 1993, and for time-division optical multiplexing.--

Please replace the paragraph beginning at page 1, line 25 through page 2, line 5, as follows:

--In the case of transmission over so-called step-index fibres, or SI fibres, (as for example described in ITU-T Recommendations G650 1993 and G652 1993) and with dispersion compensation, it is useful to have available fairly long pulses (for example lasting from 20 to 60 ps for a transmission frequency of 10 Gbit/s) while it is observed that with

shorter-lasting pulses in the [said] SI fibre systems, with high dispersion, phenomena of dispersive wave generation are observed leading, ultimately, to an increase in the error rate of the transmission (BER).--

Page 2, please replace the paragraph at lines 8-13, as follows:

--The term "chirp" is understood to mean a variation in the frequency of the signal during its amplitude modulation, so that there is a (central) frequency of the signal which is different at the start of the pulse from the (central) frequency of the signal at the end of the [said] pulse.--

Page 2, please replace the paragraph at lines 14-18, as follows:

--The Patent WO 9616345 describes an apparatus which uses two amplitude modulators controlled by two phase-locked modulating voltages, one having double the frequency of the other, in which the larger is the speed of pulse repetition.--

Please replace the paragraph beginning at page 2, line 33, through page 3, line 8, as follows:

--The Patent US 5157744 describes a soliton generator which comprises an amplitude modulator with Mach-Zehnder interferometer with a multiple series of distributed electrodes, driven at harmonically correlated frequencies. The Patent states that the process of combining several high-frequency signals into a single signal involves large attenuations and requires amplification, and that the transmission and processing of the final signal, which is a composite of many high-frequency signals, is extremely difficult. Moreover, if the composite signal requires amplification, a very expensive amplifier is required[,] that is able to amplify many very high frequencies uniformly. The invention of US 5157744 is aimed at a soliton generator which avoids these problems.--

Page 3, between lines 28 and 29 please insert the following section title:

--<u>SUMMARY OF THE INVENTION</u>--.

Page 3, please replace the paragraph lines 29-35, as follows:

--According to one aspect of the present invention, it is found that, by applying to a modulator of an optical signal a drive signal consisting of a periodic signal at one frequency, combined with at least one harmonic of the [said] periodic signal, it is possible to generate pulses of an amplitude suitable for pulsed optical communication, of the soliton type or the like.--

Page 10, between lines 11 and 12, please insert the following section title:

--<u>BRIEF DESCRIPTION OF THE DRAWINGS</u>--.

Page 11, between lines 8 and 9, please insert the following section title:

--<u>DESCRIPTION OF THE PREFERRED EMBODIMENTS</u>--.

Page 11, please replace the paragraph at lines 24-31, as follows:

--For the purposes of the present description, the term second harmonic of a signal of given frequency is understood to mean a signal with double the frequency of the [said] given frequency, the [said] fundamental frequency; the terms third harmonic, fourth harmonic, etc. are understood to mean signals at frequencies respectively triple, quadruple etc. the [said] given fundamental frequency.--

Please replace the paragraph beginning at page 11, line 32, through page 12, line 2, as follows:

--For the purposes of the present invention, the term frequency of a periodic signal is understood to mean the frequency of the sinusoid, in the case in which the periodic signal is a sinusoidal signal, or else the frequency of the fundamental sinusoid in the Fourier series expansion of the signal, in the case in which it has a non-sinusoidal temporal profile, and the

term higher harmonics is understood to mean whole multiple frequencies of the [said] sinusoid or of the [said] fundamental frequency.--

Page 12, please replace the paragraph at lines 5-12, as follows:

--Hereafter, unless otherwise specified, the terms "sinusoidal signal" and "harmonic of the frequency of the sinusoidal signal" are used to mean that these comprise either signals with sinusoidal time profile and appropriate harmonics or signals with a different time profile, for example with a triangular, square or similar wave, or else with a more complex profile, for example with a $sech^2$ (t) profile, (typical of soliton pulses), and signals at harmonic frequencies of the fundamental frequency of the [said] signals, having the same or a different time profile.--

Page 12, please replace the paragraph at lines 16-19, as follows:

--Such electrical signals with different frequencies are combined together by means of a combining filter 7 (described hereafter) possibly after [amplifica-tion] amplification by respective amplifiers 8, 9, 10.--

Page 14, please replace the paragraph at lines 17-20, as follows:

--It is known that the [said] secondary peak, if its value is too high, could be detected as a 1 value in the digital transmission, even if the corresponding main peak has been deleted following the prescribed modulation.--

Page 19, please replace the paragraph at lines 20-24, as follows:

--In particular, the [said] interfacing units generate respective optical work signals having wave-lengths λ_1, λ_2, λ_3, λ_4, λ_5, λ_6, and so on, included within the useful working band of the amplifiers arranged subsequently in the system, having, in addition, RZ pulsed modulation characteristics.--

Page 20, please replace the paragraph at lines 16-21, as follows:

--Via the fibre 34 the [said] work signals are sent to a power amplifier 35, which raises their level to a value sufficient to traverse a subsequent stretch of intervening optical fibre ahead of fresh means of amplification retaining at the end a power level which is sufficient to guarantee the required transmissive quality.--

Page 24, please replace the paragraph at lines 7-10, as follows:

--Preferably, in the presence of a total of 10 between line amplifiers 37 and preamplifier 39, each of the [said] chromatic dispersion compensation units 42 is designed to compensate around 1550 ps/nm.[,]--

IN THE CLAIMS

Please amend the claims as follows:

--35. (Amended) Pulsed transmission system according to Claim 34, wherein said optical signal at said transmission wavelength has, for at least one portion of its propagation path in one of said first and second optical conductor elements, an intensity of a value such as to cause self phase modulation of said [second] optical signal.

42. (Amended) High-speed optical pulse transmitter, comprising:

an optical signal modulator;

an optical pulse modulator, optically linked to said signal modulator;

a generator of a continuous optical signal, optically linked to said signal and pulse modulators;

a signal modulator driver for feeding said signal modulator with an electrical signal bearing a coded information with a first frequency; and

a pulse modulator driver comprising:

a circuit for generating a first periodic electrical signal at said first frequency;

a circuit for generating a second periodic electrical signal at a second frequency which is a harmonic of said first frequency;

a first and a second amplifier for amplifying said first and second periodic electrical signal; and

a combining element for combining said amplified first and second periodic electrical signals, and for feeding said pulse modulator with said combined signal;

wherein said signal modulator emits a sequence of substantially chirp-free optical pulses at the transmission wavelength having a duration T_{FWHM}, the ratio T_{bit}/T_{FWHM}, between the inverse T_{bit} of said preset frequency and said duration T_{FWHM} of the pulses, being higher than 200/75 and lower than 10.

52. (Amended) Method of high-speed optical transmission, comprising the steps of:

generating an optical signal;

modulating said optical signal with a periodic drive signal;

modulating said optical signal with an information bearing signal at a preset frequency; [and]

generating said periodic drive signal by combining an amplified periodic signal at said preset frequency and at least an amplified periodic signal at a harmonic of said preset frequency, and

emitting a sequence of substantially chirp-free optical pulses at the transmission wavelength having a duration T_{FWHM}, the ratio T_{bit}/T_{FWHM}, between the inverse T_{bit} of said preset frequency and said duration T_{FWHM} of the pulses, being higher than 200/75 and lower than 10.--